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In this issue

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Faculty Disclosure

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Stroke: Recognition, Treatment, and Recovery

Educational Objectives

A patient's ability to recover from a stroke depends on multiple factors, including the nature of the stroke, treatment and rehabilitation, the patient's motivation, and the cooperation of family or friends. After participating in this educational activity, the learner will be able to:

1. Recognize the effects of a stroke in different parts of the brain.
2. List the main causes of strokes in different age groups.
3. Identify nursing strategies for optimal outcomes after a stroke.
4. Describe the acute presentation of a stroke in different organ systems.
5. Discuss behavioral changes that patients may experience after a stroke.

Signs and Symptoms Across the Ages

Assesment

Left cerebral stroke — Signs and symptoms include aphasia (left hemisphere controls language functions), left gaze preference (eyes drift toward location of lesion), deficits in right visual field, right weakness or hemiparesis, and right hemisensory loss (diminished sensation on right side).

Right cerebral stroke — Signs and symptoms include left-sided neglect or inattention (patient does not seem to recognize his or her left arm or leg), right gaze preference, deficits in left visual field, left hemiparesis, and left hemisensory loss.

Brainstem stroke — Signs and symptoms associated with a brainstem stroke can be unsettling because this area controls the balance center and autonomic functions such as heart rate and blood pressure (BP). Hemi- or quadriparesis and hemi- or quadrisensory loss may occur, along with crossed signs (signs on left face and right body), double vision, gaze palsy, or dysconjugate gaze. Vertigo is a common presenting sign. Tinnitus, nausea, vomiting, hiccups, abnormal respiration, and decreased consciousness may occur.

Cerebellar stroke — The cerebellum also regulates balance, so deficits here may be manifested as truncal or gait ataxia, as well as other signs, *eg,* abnormal heart rate or BP — "the centers are there; they're just not working correctly."

Hemorrhagic stroke — A severe headache is the classic symptom of a hemorrhagic stroke and should be an immediate red flag whenever someone arrives at the emergency department complaining of a headache (the worst they have ever had and nothing like any other

Causes of Stroke According to Age Group

Infants and neonates
- Cardiac disorders
- Emboli
- Infections
- Coagulopathies
- Perinatal events, *eg,* asphyxia

Children
- Congenital heart disease (most common cause)
- Infectious disorders
- Inflammatory disorders
- Sickle cell disease
- Trauma

Young adults (18-29 yr)
- Small vessel disease

Middle-aged adults (29-40 yr)
- Cardioembolism (patent foramen ovale most common)
- Arterial dissection
- Atrial-septal aneurysm
- Myxomatous mitral valve prolapse
- Coagulopathies and vasculitis
- Cerebral artery inflammation
- Stroke of unknown etiology

Older adults (>40 yr)
- Cardioembolism (atrial fibrillation most common)

headache they have experienced). Other symptoms and signs include neck pain and stiffness, sensitivity to light, nausea and vomiting, and sleepiness.

Management

Children — Management is based on trials in adults and consists mostly of administration of low-dose aspirin. Surgery is indicated if there is significant brain swelling.

Pediatric hemorrhagic stroke is an indication for emergency surgery, with anticoagulants recommended if carotid dissection has occurred. Moya moya (a tangle of fragile blood vessels that may bleed) may require vascular surgery for correction.

Ischemic stroke — New evidence suggests that recovery is faster and easier if patients lie with the head level rather than raised, contrary to former opinion (hemorrhagic stroke patients should keep the head elevated to about 30°). Administer normal saline to maintain fluid volume, and keep blood glucose <200 mg/dL. Keep the patient afebrile, as a fever may extend the area of infarction. Do not allow the patient to eat or drink for the first 24 hr. Slightly elevated BP helps maintain tissue perfusion, so anything <220/110 mm Hg does not require treatment.

Hemorrhagic stroke — Monitor the patient's airway, breathing, and circulation (ABCs), and check neurologic status frequently. Provide ventilatory support and cautious control of BP (hypertension is dangerous for these patients). Correct coagulopathies, and guard against elevated intracranial pressure (ICP). Prevent deep vein thrombosis and pneumonia and, as soon as the patient is ready, offer speech, physical, and occupational therapies.

Surgery is controversial, but may help appropriately selected patients. Candidates include younger patients with accessible lesions and generally good status. Rapid deterioration, hydrocephalus from ventricular obstruction, or cerebellar hemorrhage >3 cm in diameter are contraindications to surgery.

To prevent complications, do not offer the patient anything by mouth until he or she has undergone a swallowing study or has been cleared by a speech therapist. To prevent ulcers and pressure palsies, turn the patient and minimize pressure on pressure points. Early physical and occupational therapy and rehabilitation may slow, if not stop, loss of function. Good nutrition also is important.

Administer antiplatelet agents to patients who have atrial fibrillation or cardioembolism. Carotid endarterectomy is indicated for people with carotid stenosis.

Prevention

Neonates and children — Early and regular prenatal care is the best way to prevent strokes in this population.

Elderly — Keep risk factors under control, most notably the "four horsemen of the stroke apocalypse," *ie,* hypertension, hyperlipidemia, diabetes, and smoking. As patient advocates, nurses should play an aggressive role in educating patients and helping them address these issues.

BP — Systolic pressure usually should be <140 mm Hg, and diastolic, <90 mm Hg, but may need to be even lower in patients with a history of cardiac or cerebral events. Lifestyle measures, *eg,* weight control, physical activity, no more than one glass of beer or wine daily, and moderate sodium consumption can help patients achieve this goal.

Diabetes — Changes in diet and exercise may be sufficient to keep glucose under control. Nurses who take the time to explain this and to discuss nutritional principles often find that patients are willing to put these suggestions into practice. Patients who cannot control their glucose, despite these measures, can use insulin or oral hypoglycemic agents.

Lipids — Total cholesterol should be maintained at <200 mg/dL. Of that, the "good" cholesterol (high-density lipoprotein [HDL]) usually should be >35 mg/dL, and the "bad" cholesterol (low-density lipoprotein [LDL]) <130 mg/dL. Patients with a history of cardiac or cerebral events should aim for an HDL of ≥50 mg/dL and an LDL ≤100 mg/dL.

Smoking — Tailor an action plan around the aspects of quitting that the patient finds most difficult. For example, if he or she smokes under stress, suggest other stress-reduction techniques. Enlist the family's cooperation whenever possible.

Patient with atrial fibrillation — For the patient <65 yr of age who has no other risk factors, daily aspirin is the recommended approach. Patients in that age range with risk factors should take coumadin, with a goal international normalized ratio (INR) of 2.0 to 3.0.

Patients 65 to 75 yr of age who have no risk factors are candidates for aspirin or coumadin. With risk factors, they should take coumadin and, as with younger patients, aim for an INR of 2.0 to 3.0. This approach also is recommended for patients >75 yr of age, whether or not they have risk factors.

Acute Care Strategies

Neurologic Assessment

The first priority is to check the patient's vital signs and ABCs. BP should be neither too high nor too low, and cardiac rhythm should be stable. Look for signs of progressing cerebral ischemia or edema, as well as for signs of progressing stroke. Seizures are possible during the acute phase of a stroke and should be treated with antiseizure medication if necessary.

In general, the unstable period lasts until recanalization is complete. Its characteristics include: persistent arterial occlusion, fluctuating symptoms, decreased perfusion, thrombus embolization, and falling BP.

Patients with hemispheric strokes involving >50% of the middle cerebral artery have a higher-than-average risk for cerebral edema and may develop herniation.

Clinical signs — Progressively diminishing level of consciousness, vomiting, decorticate or decerebrate posturing, and progression to herniation are all signs of neurologic instability and deterioration. ICP may not be elevated during the early part of stroke, but transcranial Doppler ultrasonography will reveal pressure gradients across the 2 hemispheres.

Brain ischemia occurs within the first 24 to 48 hr of stroke. Basic management consists of avoiding noxious stimuli, relieving pain, and maintaining a lower-than-normal body temperature.

Cardiovascular Assessment

Cardiac ischemia often occurs secondary to stroke. Continuous cardiac monitoring should be performed to check for arrhythmias and ST- or T-wave alterations. Cardiac enzymes may be elevated. Routine treatment should include β-blockers to protect the myocardium, but proceed with caution in patients with history of heart blocks. Patients who have suffered a stroke or are hemodynamically unstable should undergo 12-lead electrocardiography.

Eighty percent of stroke patients experience transient elevation of BP, which confers survival benefit because it helps maintain cerebral perfusion. BP gradually returns to normal over the next few days. As yet, there is no consensus on whether treatment of this moderate hypertension is warranted, and the American Heart Association recommends it only for BP >220/130 mm Hg. Other factors to consider include the patient's previous BP readings, and use of antithrombolytics or anticoagulants.

The intravenous drugs of choice for controlling BP in these patients include labetalol, enalapril, and nitroprusside for patients with persistent hypertension.

Respiratory Assessment

Early changes in respiratory function due to decreased level of consciousness are rare, although respiration may be compromised if the patient experiences a middle cerebral artery or brainstem infarct. Management consists of maintaining adequate ventilation, with an SpO_2 >92%. Monitor the patient for hypoventilation, especially if level of consciousness is diminished.

The combination of hypoxia, hypoventilation, and low cerebral perfusion pressure forms a worst-case scenario when it comes to risk for aspiration. Pneumonia accounts for 15% to 25% of stroke deaths, and most of those cases are caused by aspiration.

Managing aspiration pneumonia risk — Nasogastric tube feeding is helpful but does not eliminate the risk completely, because the tube may become dislodged.

Other causes of pneumonia — Immobility is a prominent culprit. Prompt mobilization is probably the best way to prevent pulmonary embolization and deep vein thrombosis. Contraindications to mobilization include the presence of unstable ischemia, orthostatic hypotension, and unstable cardiopulmonary status.

Pulmonary embolism — This is a common cause of death, even among patients who recover from their strokes successfully, due to prolonged immobilization in the early stages of recovery. Management includes ambulation as soon as possible, anti-

Reasons for deterioration in acute ischemic stroke

- Dehydration or overhydration
- Arterial hypotension
- Extreme arterial hypertension
- Fever
- Elevated glucose
- Hypoventilation or CO_2 retention
- Hypoxia
- Aspiration and pneumonia
- Sepsis or infection
- Pulmonary embolism
- Myocardial ischemia
- Cardiac arrhythmias
- Congestive heart failure
- Neurogenic pulmonary edema
- Epileptic seizure
- Electrolyte imbalance
- Thiamine deficiency
- Organic delirium
- Psychiatric factors

coagulants, physical therapy, and compression devices and stockings to improve the patient's circulation during bed rest.

Gastrointestinal Assessment

Keep the patient NPO until swallowing function has been evaluated. Even after oral feedings have been approved, watch for aspiration.

Genitourinary Assessment

Retention is common in the early days after a stroke. However, indwelling catheters should be avoided, because they introduce another potential source of infection.

On the other hand, incontinence also is common among these patients and may contribute to skin breakdown.

Homeostasis of Body Systems

Dehydration — Almost all stroke patients experience dehydration due to numerous factors, including swallowing difficulties, problems with cognition and communication, infections, use of diuretics before the stroke, hyperthermia, restlessness, and possible preexisting dehydration. Treatment consists of rehydration with an isotonic solution, taking care not to overhydrate the patient.

Serum glucose — >20% of stroke patients are hyperglycemic on admission to the hospital. Elevated glucose is associated with an increase in infarct size and may lead to hemorrhagic transformation. Moderately elevated glucose (110 mg/dL to 126 mg/dL) has been associated with significant increase in 30-day mortality in nondiabetic patients. Levels >144 mg/dL should be treated with small doses of rapid-acting insulin administered subcutaneously or intravenously in particularly recalcitrant cases.

Temperature — Elevated temperature has been linked to poor outcomes after stroke. In one study, the risk for poor outcome increased by a factor of 2.2 for every 1°C rise in body temperature.

Decubitus ulcers — These ulcers can arise within minutes. Patients who sit on a wheelchair for as little as 2 hr without changing position are at risk. That risk is exacerbated when sensation is diminished, so they do not necessarily feel sore.

Psychologic and Social Assessment

Depression is common in these patients. Nurses should assess for it and be prepared to manage depression when it occurs.

Communication impairments can have a significant impact on psychological well-being. Nurses should think about ways they can help patients improve their communication skills, perhaps by encouraging them to draw pictures that convey what they want to say.

Changes in family dynamics are inevitable, as a formerly independent person is now dependent on those around him or her.

All procedures should be explained to the patient, regardless of whether he or she understands the explanation.

Preparations for leaving the hospital are covered in discharge planning. This includes determining where the patient will go and arranging for him or her to make the transition. If the patient is returning home, make sure there is adequate care waiting for him or her. Good discharge planning starts the moment the patient enters the hospital.

Understanding Stroke Behaviors

Introduction

A stroke may affect a variety of behavioral components. The actual changes that occur depend on individual factors, including the location of the stroke.

Quality Control

This refers to a person's social judgment, or his or her ability to guide and check his or her behavior, *ie,* "doing the right thing at the right time." Often, family members realize that the patient's behavior has changed and alert the clinician. These patients often do not realize that their behavior may seem irrational or inappropriate. Patients may need guidelines and a system of cues, gentle reminders, and positive reinforcement to remind them to refrain from unacceptable behaviors like excessive talking or inappropriate flirting.

General Memory Deficits

Memory problems accompany all brain injuries, no matter how slight. A right-sided stroke affects the spatial-perceptual components of memory, while a left-sided stroke affects the language components.

Spatial-perceptual deficits — These patients need help in remembering their limb placement or in coordinating their movements to avoid bumping into things. Patients may not realize that they have this type of deficit and will blame other people or circumstances, like a malfunctioning car, for their errors.

Language deficits — A patient who has experienced a left-sided stroke may know what he or she wants to say, but sometimes cannot say it at all or says the wrong word.

Retention Span

This refers to the amount of information in a message that a patient can retain and act upon. Stroke survivors typically have a very short retention span, so they can remember only 2 or 3 steps of a complex message. Written instructions or pictures can help them accomplish tasks.

Old *vs* New Memory

Information acquired before the stroke (old memory) often survives

intact, but new learning may be difficult, as the brain has lost some of its ability to retain new information. A classic example is a patient who recognizes a grandchild born before the stroke, but cannot remember a grandchild born afterward. Memory books and pictures can be extremely helpful in these cases.

Generalization

Patients with a deficit in this component cannot apply lessons learned in one setting to another setting. This makes them extremely vulnerable to even minor environmental changes. Behavior often deteriorates in these circumstances. For these patients, rehabilitation and recovery should include visits to the new environment and, whenever possible, advance preparation of any variations from the usual schedule.

Emotional Lability

Loss of emotional control is common among stroke survivors. A change of attention or focus often produces an instantaneous change in emotional affect.

Deprivation Effects

Sensory deprivation is common after a stroke. Stimulation ramps up significantly during rehabilitation, leaving patients agitated and sleepless at the end of the day. Mild enrichment of the immediate environment, like a radio playing softly or a dim bedside light, often helps them fall asleep.

Sensory Overload

The opposite of deprivation effects may occur when the patient is so overwhelmed by the day's events that he or she is exhausted at night and does not respond to further stimuli, like visitors. This failure to interact is a sign that the patient is overloaded and should be given some time to recover.

Summary of Right Hemisphere Sequelae

A right-hemisphere stroke may lead to lack of insight, spatial perceptual deficits, quick and impulsive behavior, memory problems, poor judgment, and loss of artistic ability.

Summary of Left Hemisphere Sequelae

Right-sided paralysis is a hallmark of a left hemisphere stroke. In contrast to survivors of a right hemisphere stroke, these patients often exhibit slow, cautious behavior because they realize something is wrong; they just cannot say what. Problems in organizing and planning tasks also are characteristic. Gentle guidance and lavish positive reinforcement are necessary in these cases because the patient is easily frustrated and will quickly give up. Problems with dressing and self-care may occur, as well as deficits in reading, writing, reasoning, and calculating.

Suggested Reading

Adams, H., Adams, R., Del Zoppo, G., Goldstein, L.B., Stroke Council of the American Heart Association, & American Stroke Association. (2005). Guidelines for the early management of patients with ischemic stroke: 2005 guidelines update. A scientific statement from the Stroke Council of the American Heart Association/American Stroke Association. *Stroke*, 36(4), 916-923.

Dix, A. (2005). Clinical management. Stroke of genius. *Health Services Journal,* 115(5958), 26-28.

Hochstenbach, J., Prigatano, G., & Mulder, T. (2005). Patients' and relatives' reports of disturbances 9 months after stroke: subjective changes in physical functioning, cognition, emotion, and behavior. *Archives of Physical Medicine and Rehabilitation*, 86(8), 1587-1593.

Kirkness, C.J., Thompson, J.M., Ricker, B.A., Buzaitis A., Newell, D.W., Dikmen, S., et al. (2002). The impact of aneurismal subarachnoid hemorrhage on functional outcome. *Journal of Neuroscience Nursing,* 34(3), 134-141.

Lindsay M.P., Kelloway, L., & McConnell, H. (2005). Research to practice: nursing stroke assessment guidelines link to clinical performance indicators. *Axone*, 26(4), 22-27.

Williams, J. (2005). Advances in prevention and treatment of stroke and TIA. *Nursing Times,* 101(14),30-32.

Wojner-Alexander, A.W., Garami, Z., Chernyshev, O. Y., & Alexandrov, A.V. (2005). Heads down: flat positioning improves blood flow velocity in acute ischemic stroke. *Neurology*, 64, 1354-1357.

Remarks represent viewpoints of the speakers, not necessarily those of Nurses-Digest.

Stroke: Recognition, Treatment, and Recovery

Test Questions (pretest and posttest)

Note: Please use the CE Test and Evaluation Form to mark your answers to the questions below.

1. **Vertigo is a common presenting sign of a stroke in the:**
   (A) Brainstem
   (B) Cerebellum
   (C) Left cerebral hemisphere
   (D) Right cerebral hemisphere

2. **You should suspect a hemorrhagic stroke if a patient complains of:**
   (A) Weakness in both legs
   (B) Ringing in the ears
   (C) Extremely severe headache
   (D) Hallucinations

3. **The most common cause of strokes in children is:**
   (A) Trauma
   (B) Familial hypercholesterolemia
   (C) Asphyxia
   (D) Congenital heart disease

4. **Of the following, which is indicated for a patient who has suffered an ischemic stroke?**
   (A) Reclining with the head level
   (B) Keeping blood pressure <200/100 mm Hg
   (C) Prompt oral administration of aspirin
   (D) Elevation of the lower limbs

5. **All the following are among the "four horsemen of the stroke apocalypse," except:**
   (A) Smoking
   (B) Obesity
   (C) Diabetes
   (D) Hypertension

6. **Brain ischemia associated with a stroke usually occurs within ____ after the initial infarct.**
   (A) 21-30 days
   (B) 5-10 days
   (C) 3-7 days
   (D) 1-2 days

7. **In the acute period after a stroke, almost all patients experience some degree of:**
   (A) Hyperglycemia
   (B) Fever
   (C) Dehydration
   (D) Delirium

8. **Decubitus ulcers may develop in an immobile patient within:**
   (A) 2 hr
   (B) 8 hr
   (C) 24 hr
   (D) 48 hr

9. **A patient who frequently bumps into things most likely has had a stroke on the _____ side.**
   (A) Right
   (B) Left

10. **All the following are sequelae of a left-sided stroke, *except:***
    (A) Slow, cautious behavior
    (B) Disorganization
    (C) Tendency to blame mistakes on others
    (D) Low frustration tolerance

Answers to Nurses-Digest Volume 02, Number 09: 1-C, 2-D, 3-B, 4-A, 5-B, 6-D, 7-C, 8-A, 9-D, 10-C.

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